

## **AMENDMENTS TO THE SPECIFICATION:**

Please amend the specification as follows:

Page 3, replace the paragraph beginning on line 30 with the following amended paragraph:

said first layer being converted at its surface by treatment with solutions at elevated temperatures that contain an active compound or compounds capable of rendering said first polymeric material ~~insoluble to~~ less soluble in an aqueous alkali developer at the point of contact ; the first layer being oleophilic.

Page 4, replace the paragraph beginning on line 17 with the following amended paragraph:

The positive working thermal imaging assembly of the present invention ~~contain~~ contains basically a first layer having its upper surface duly treated with a compound or compounds capable of rendering said first polymeric material ~~insoluble to~~ less soluble in an aqueous alkali developer. The first layer is usually a soluble alkali phenolic resin such as novolak as the binding polymer; optionally containing compounds that absorb and convert light to heat and/or a coloured dye or pigment.

Page 4, replace the paragraph beginning on line 25 with the following amended paragraph:

The first layer is applied to the substrate and thereafter it is treated with solutions at elevated temperatures that contain an active compound or compounds capable of rendering said first polymeric material ~~insoluble to~~ less soluble in an aqueous alkali developer at the point of contact. The alkali-soluble polymer of the first layer is rendered ~~alkali-insoluble~~ less alkali soluble by the application of the active compound or

compounds which are usually applied in a non-solvent for the first layer, for example, using toluene.

Page 5, replace the paragraph beginning on line 10 with the following amended paragraph:

The coating itself is not significantly affected by UV radiation. Prior to the treatment, both the first layer and the active compound or compounds, in isolation or individually, are soluble in alkali but together they become ~~insoluble~~ less soluble. The first layer having its surface treated with the active compound/compounds, forms a Thermally Imageable Element (TIE). The formation of such TIE element composed by the first layer and a very thin layer ~~resulted~~ resulting from the treatment with the active compound/compounds is a critical and essential feature of the invention. In isolation neither layer is imageable by image-wise exposure to infra-red radiation.

Page 6, replace the paragraph beginning on line 18 with the following amended paragraph:

the possibility for areas of no or low levels of Surface Conversion Treatment (coating as a ~~merely~~ merely a technique to affect a change of a conversion process at the surface of the first layer rendering it less alkali ~~insoluble~~ soluble) are much reduced thus reducing the chance of failure in the field and yield loss in manufacture;

Page 8, replace the paragraph beginning on line 27 with the following amended paragraph:

The positive working thermal imaging assembly of the present invention has many advantages as compared to the conventional printing plates made from other

compositions. One of the advantages of the present invention is that preheating of the binding polymer system so to image prior to development is not required. Another advantage of this invention is that pre-exposure to ultraviolet radiation prior to infrared image is not needed. Still another advantage of this invention is that low concentration of infrared sensitive dye is used since the treatment of the first layer interacts with and protects and ~~insolubilize~~ renders the resin of the first layer less soluble, allowing development thereof in high pH developers, about 14, of the kind used for conventional positive plates (PD2 IBF developer), after exposure. An additional advantage is that the positive working thermal imaging assembly containing the Thermally Imageable Element (TIE) of the present invention may be processed in different radiating devices, at wavelengths such as from ~~[[830]]~~ 810 nm to 1064 nm. Still another advantage is that the coating compositions of the present invention do not emit particles or vapors (ablation), avoiding the formation of precipitates on the infrared-emitting devices and the evolution of harmful vapors to the environment during exposure.

Page 13, replace the paragraph beginning on line 7 with the following amended paragraph:

As described above, the components necessary to furnish a product sensitive to radiation in the range from 700 and 1200 nm forms a Thermally ~~imageable~~ Imageable Element (TIE), essentially composed of a first layer containing a binding polymer and one thin layer. The thin layer is formed over the first layer when the active compound is applied over the same which comprises one or more polymeric active ~~compound~~ compounds which ~~interacts~~ interact and ~~adheres~~ adhere to the binding polymer of the

first layer, making it ~~insoluble~~ less soluble in the developer for conventional positive plates.

Page 22, replace the paragraphs beginning on line 5 through page 26, line 29 with the following amended paragraphs:

#### Example 9

This example shows the possibility of treating by immersion technique the aluminium substrate coated with the first layer of the invention. The active compound Solspere was applied by immersion onto a substrate coated with novolac. The assembly was thereafter rinsed and dried (~~sample S-Oct-Ui and 02~~).

9.1. Using a standard first layer of ~~Novelac~~ novolac and Solspere 20,000 as the active agent in toluene, the time/temperature/concentration conditions were varied to find a process window that gives good results. All plates used were standard first coated product and were exposed on an Optronics Aurora thermal platesetter at 150 mJcm<sup>2</sup> with a target 50% image pattern. (~~sample S-Nov-I-A-1~~). The summary of the variations are listed below:

Conc./%	70		80		90		Temp/°C
	30	60	30	60	30	60	Time/s
0.05	✓	x	✓	x	x	x	
0.025	✓	✓	✓	x			

Roughly assessing the appearance of the derived un-inked 50% screen image, the preferred process conditions appear to be Solsperse at 0.025% at a temperature of 70-75°C.

9.2. To fine tune this process a test was done at 75°C[[.]] with Solsperse at 0.025% with immersion times in 10 second intervals on the same plate. This showed the following results as measured by ccDot densitometer suggesting a large 30 second process window between 20 and 50 seconds. (Sample S-Nov-IA-2)

Time/s	10	20	30	40	50
Density/%	39	49	49	49	48-49
Inked Density/%	38-40	49	49	48-50	48-50

9.3. In order to improve the flexibility and safety hazard of the process to determine if a non flammable solvent could be used, test 9.2 was repeated by substituting water in place of toluene and achieved the following results. (S-Nov-IA-3)

Time/s	20	30	40	50	60
Density/%	37	38.75	40	41	44

Although the ~~The~~ process is [[a]] slower process in water than in toluene at this concentration, ~~but it does show the relationship between treatment time and dot density where on average 11 seconds of treatment equates to 1% of dot density. This would predict that a 2 minute immersion time would be required for a 50% dot or 60 seconds at double concentration. In both of these experiments there was severe attack of the~~

first coating (first layer). At lower concentration immersed for 2 minutes (sample S-Nov-IA-3a) the attack was in the form of spots. Solsperse 20,000 is not water soluble but in these experiments is dispersed presumably as small droplets suspended in water so perhaps under these conditions the droplets are able to dissolve the phenolic coating. In the second case of higher concentration there was large scale image attack after immersion for 30 seconds (sample S-Nov-IA3b).

### Example 10

10.1. Using a standard first layer as in example 9 and 0.05% Solsperse 27,000 as the active agent in **water** (it is soluble in water) at 75°C, the immersion time was varied from 20 to 60 seconds. Image attack was apparent on the 60 second immersion time sample prior to exposure. All plates were exposed on an Optronics Aurora thermal platesetter at 150 mJ/cm<sup>2</sup> with a target 50% image pattern. All immersion times appeared to result in over-treatment although partial images of the target screen were visible (S-Nov-IB-1a). This was repeated using Solsperse 27,000 at 0.0125% concentrations (S-Nov-IB-1b) and again shows this is faster even at low concentrations and less controllable as a process.

		Temperature = 75°					
		Time/2	20	30	40	50	60
Solsperse 27,000 conc./% in water	0.05	x	x	x	x	Attack	
	Time/s	5	10	15	20	30	
	0.0125	41	43	45	41*	43*	

\*Separate experiment

10.2. Experiment 10.1 was repeated using 0.025% Solsperse 27,000 in **toluene** and immersion times of 20 to 60 seconds. Images were clear on all but the 60 second example but only the 20 second example developed cleanly to leave an excellent image (~~sample S-Nov-IB-ic~~). The Solsperse 27,000 15 concentration was reduced to 0.0125% and the experiment repeated to give the following results (~~sample S-Nov-IB-1d~~).

		Temperature = 75°				
	Time/2	20	30	40	50	60
Solsperse 27,000 conc./% in toluene	0.05	-	-	-	-	-
	0.025	✓	x	x	x	x
	0.0125	35%	49%	53.5%	x	x

By the results, Solsperse 27,000 has a much stronger affect than Solsperse 20,000 since 10 second changes in immersion time produce dramatic effects, whereas Solsperse 20,000 is unresponsive in dot density over a broad range.

### Example 11

This example shows the use of different active components for treating (by immersion) the substrate coated with the first layer of ~~Nevelac~~ novolac.

a) 0.025 weight % Carbowax 2000 in Toluene at 75°C for 40 seconds. ~~Immerse~~ First the coated product was immersed for 10/20/30/40/50/60 seconds, ~~[[rinse]]~~ rinsed in toluene and ~~[[dry]]~~ dried. ~~[[Image]]~~ Imaged at 1 50mJcm<sup>2</sup> with a 50% screen, ~~develop~~ developed and ~~[[ink]]~~ inked half of the sample. ~~Measure and record dot~~ Dot densities (ccDot) for inked and un-inked portions were measured and recorded. ~~If poor results adjust concentration or time accordingly. [Label sample S-Dec-II-i]~~

- b) Repeat as for a) substituting Monazoline C in place of Carbowax and ~~selecting an appropriate solvent. [Label sample S-Dec-II-2].~~
- c) Repeat as for a) substituting CAB-551-0.1 in place of Carbowax and ~~selecting an appropriate solvent. [Label sample S-Dec-II-4].~~
- d) Repeat as for a) substituting the phase transfer catalyst Triton X100 in place of Carbowax and ~~selecting an appropriate solvent. [Label sample S-Dec-II-5].~~

The summary of the conditions and results are listed in the tables indicated below.

Ref	Material	1 <sup>st</sup> Coat	Comment/Ref
1	Polyethyleneglycol (Carbowax)	Standard	S-Dec-II-1
2	Monazoline C	Standard	S-Dec11-2
3	Crystal violet (0.05% in water at 75°C, 0 to 60s)	Standard	Complete wash off. (S-Nov-II-3)
4	CAB-551-0.1	Standard	S-Dec-II-4
5	Triton B	Standard	S-Dec-II-5
6			

	Temp/°C	Conc/wt% (Toluene)	Time/s	Dot Density	
				Un-inked	Inked
Carbowax	75	0.025	20	41	41.5
			30	51	51
CAB-551	75	0.025	30	37.5	37
			40	44.5	45
Triton X100	75	0.025	20	38.5	37.5
			30	44.5	43.5
Monazoline C	75	0.1	40	37.5	37.5
			50	40	40
Crystal Violet	75	0.05 (water)	0-60	-	-



	Temp/°C	Conc/wt% (Toluene)	Time/s	Dot Density	
				Un-inked	Inked
Carbowax	75	0.025	20	41	41.5
			30	51	51
CAB-551	75	0.025	30	37.5	37
			40	44.5	45
Triton X100	75	0.025	20	38.5	37.5
			30	44.5	43.5
Monazoline C	75	0.1	40	37.5	37.5
			50	40	40

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The above results show the possibility of using variations related to the active compounds for the treatment of the first layer as disclosed herein.

#### Example 12

This example shows the use of Polyvinylphenol resin (~~sample S-Dec-III-2~~) as the polymer for the first layer on an aluminum substrate. The conditions were the preferred process conditions used for the previous examples related to novolac in the first layer. Solsperse was then applied by immersion as in the previous examples. The effectiveness of Solsperse as the active component in toluene was evaluated to change the dissolution behaviour of the materials. The ~~[[Make]]~~ make up was a first coating comprising a high molecular weight Polyvinylphenol (Marukar Lyncur, CBA [styrene:butylmethacrylate copolymer] from Japan) in place of current resin system but containing current IR and visible dyes. ~~[[Treat]]~~ It was treated with Solsperse 20,000 in Toluene at 75°C for 40 seconds. ~~Rinse, rinsed~~ in Toluene, dry, image dried, imaged and ~~develop, ink developed~~. ~~[[half]]~~ Half of the sample and record the dot densities of was inked and the dot densities of inked and un-inked images [S-Dec-III-2] were

recorded. The results were satisfactory and further illustrates this embodiment of the invention.

Figure 1 attached illustrates **[[an]]** a structure of the invention, in which the bottom is the substrate; layer 1 is the optional intermediate layer; layer 2 means the first layer of binding polymer; T means the thin layer formed by the treatment with the active component and 3 means the optional third layer.